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SIM900 series download procedure V0.20

Development Kit

Hardware Design

Reference Design

Software Design

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Version History

Version	Chapter	What is new
V0.20	New version	Created by Gang Chen

Contents

1 Overview

This document describes the download procedure for SIM900 series module, it can be used when user downloads the software from the serial port of the PC to the module.

2 Procedure

The system always executes from the BOOT ROM after power on of SIM900 module.

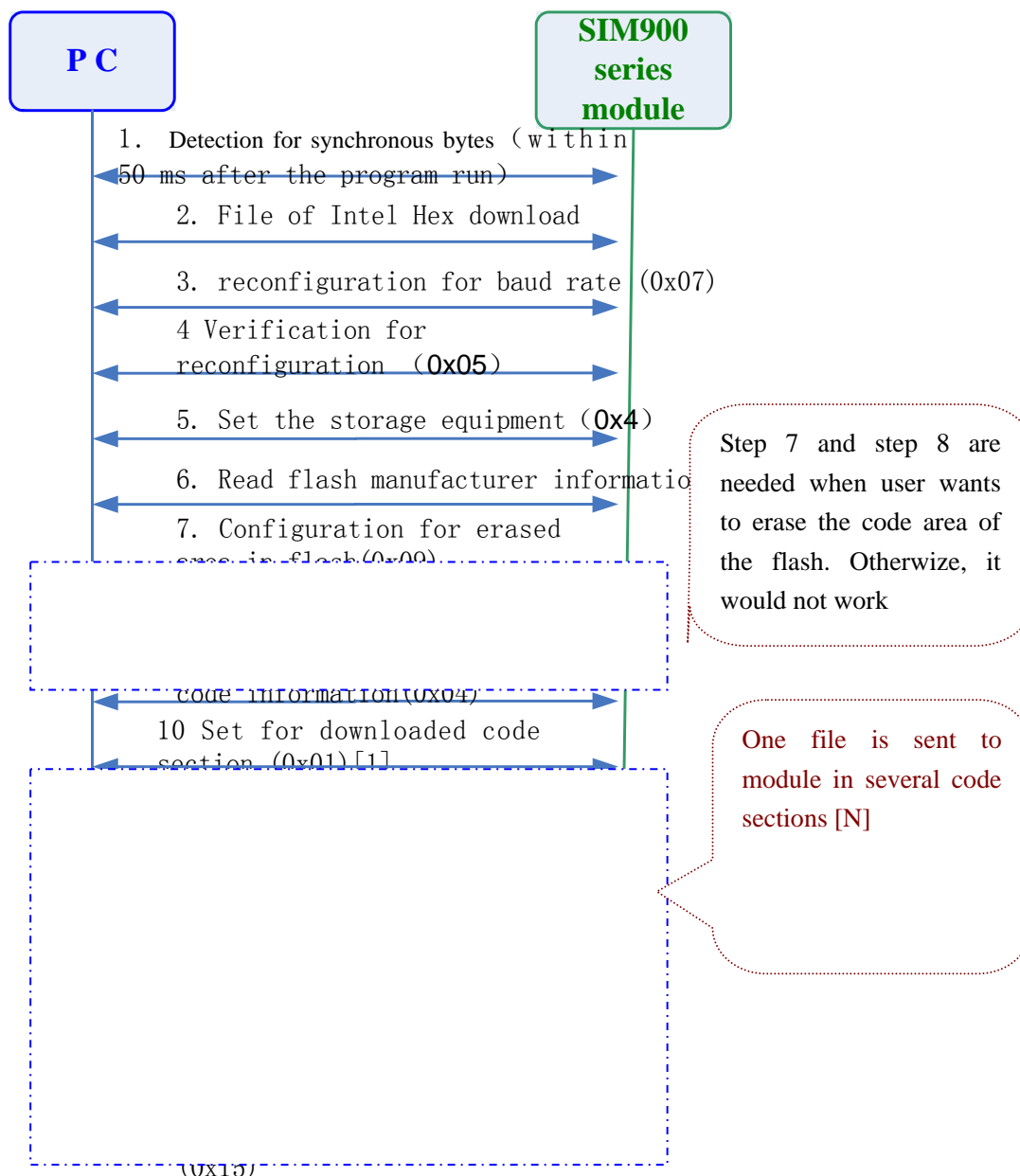Overall diagram for downloading process:

Diagram 2-1 Overall download process

2.1 Execution after module powered on

Execution steps after powering on the module:

1) Open the serial download program from PC, make sure the download serial port (MAIN or DEBUG) and the electrical supply are in good condition.

2)   Start downloaded process from PC side;

3)   Restart the module, the system will execute from BOOT ROM.

> *Note:*
>
> ***The configurations for serial port of PC and module are as follows:***
> ***115200bps, 8 bit, no check, 1 stop bit, no flow control***

2.2   Detection of synchronous bytes (0x16)

After the execution of code in BOOT ROM:

If the module receives the synchronous bytes of PC side within 50ms, the module will enter the file download process, in order to confirm the downloaded connection, module will send this byte back to the PC. PC will stop sending synchronous bytes once it receives the synchronous bytes

If the module does not receive synchronous bytes from PC side within 50ms, the execution in BOOT ROM will stop running, module will start according to normal process, program pointer will jump to the start address of Flash (0x90000000).

Thus, to make sure the synchronous process is working properly, the time interval for sending synchronous bytes should be less than 50ms, e.g., 30ms.
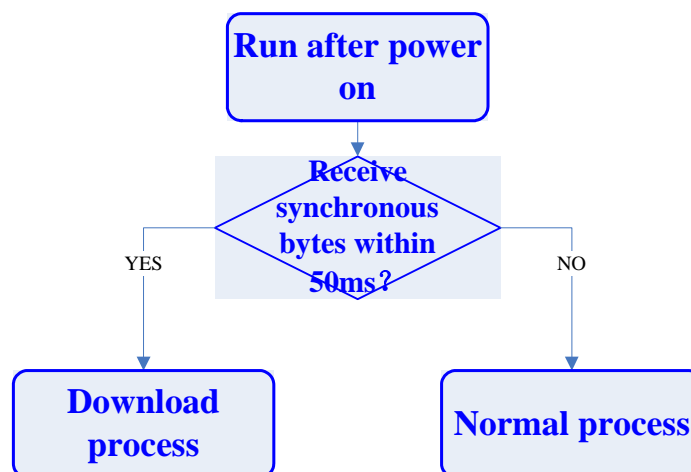
Diagram 2-2 Process of waiting for synchronous bytes
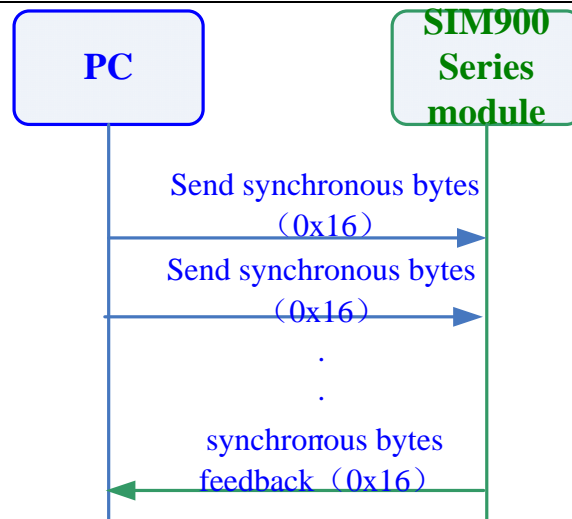
Diagram 2-3 Detection for synchronous bytes

2.3   File of Intel HEX download

File of Intel hex will be sent to module through serial port, the file usually is divided into several sections (the size may be 512 bytes). Its name usually can be seen as follows: flash_nor_16bit_hwasic_evp_4902_rel.hex

Module will download the code to the RAM of ARM. Typical time consumption is about 3 seconds. The instruction process can be seen as follows.

Diagram 2-4 File of Intel HEX download

After the module receives the last record of EOF (string: 00000001FF), which is in the file of ".hex", it will send the indication of downloading success for Hex file, according to the received

file.

PC side will confirm the success after it receives the following value.
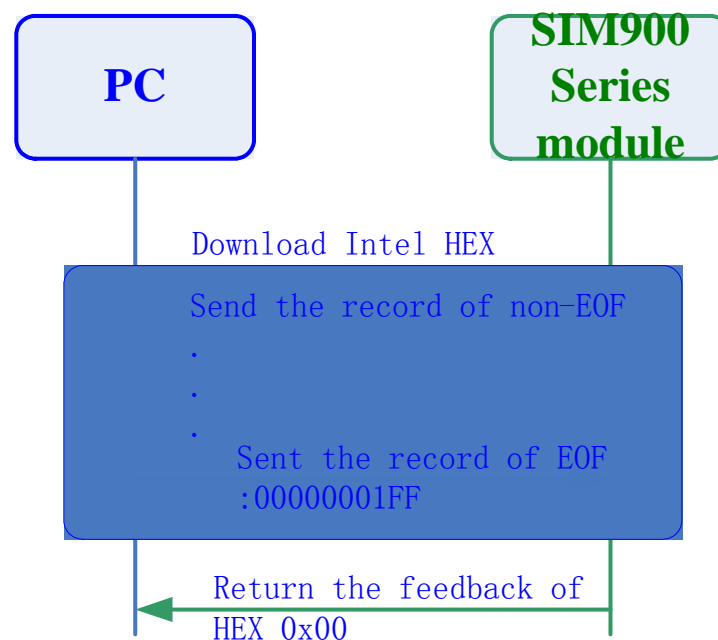
Table 2-1 Module response

Hex download result	Returned value (Hex)
Success	0x30,0x00
	0x00

2.4   Reconfiguration for downloaded serial port's Baud rate（0x07）

If "File of Intel HEX download" is successful, user can reconfigurate the baud rate of the downloaded serial port from the PC side:

PC will send the instruction of "Reconfiguration for downloaded serial port's Baud rate" to the module in the old baud rate(115200bps), if the module accept this baud rate, it will send the successful response to PC in the old Baud rate.

After that, the downloaded serial port of the module will adjust to the new baud rate. Possible baud rate may be seen as follows: 9600,19200, 38400, 57600,115200,230400,460800，921600。

(Following configurations for serial port remains same :8 bit, no check, one stop bit, no flow control):

Instruction of the process is as follows:
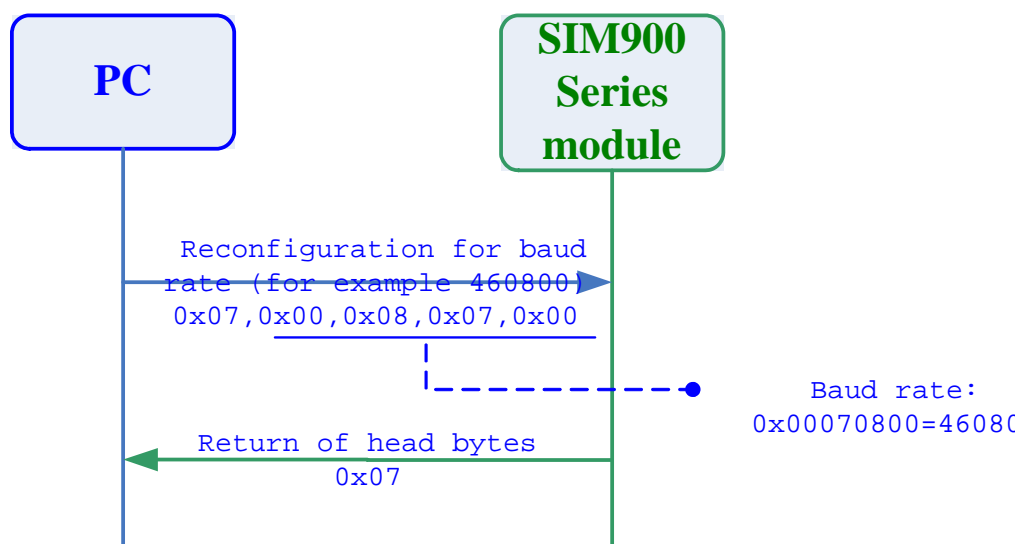
Diagram 2-5   Reconfiguration for downloaded serial port's Baud rate

2.5   Verification for Baud rate's reconfiguration（0x05）

After the module finishes the instruction process of "Reconfiguration for downloaded serial port's Baud rate", the downloading serial port for PC will adjust to the new Baud rate, send the instruction of "Verification for Baud rate's reconfiguration" to validate the reconfiguration: whether the module has adjusted to the new baud rate or not..

Instruction of the process is as follows:

Diagram 2-6   Verification for Baud rate's reconfiguration

2.6   Set the storage equipment（0x4）

After the successful execution of "Set the storage equipment", PC can send the instruction of "Set the storage equipment": configure the storage equipment.
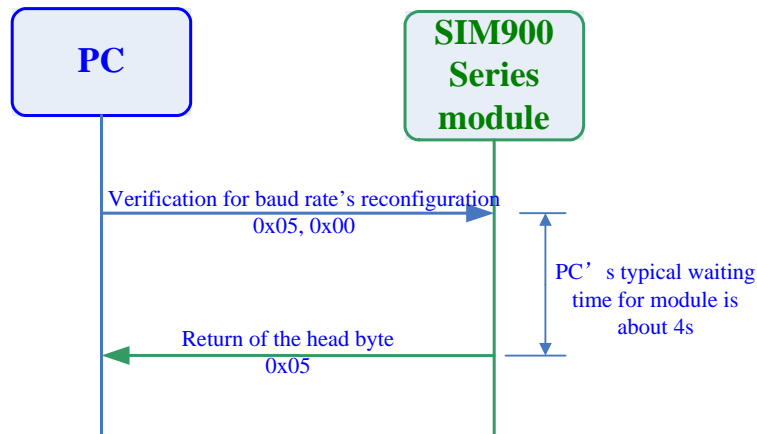
Instruction of the process is as follows:
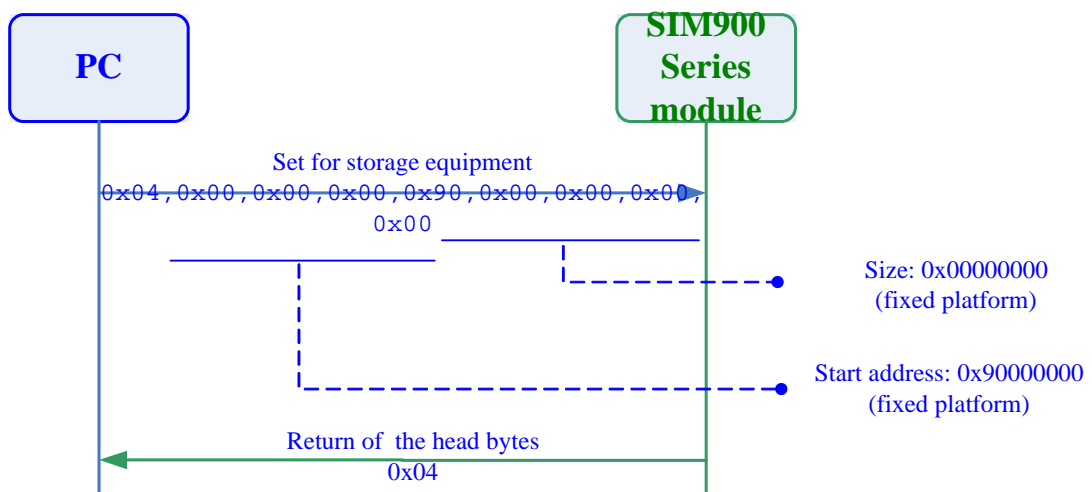
Diagram 2-7 Set the storage equipment

2.7   Read the flash manufacturer information（0x02）

After the execution of "Set the storage equipment", PC can send the instruction of "Read the flash manufacturer information": module will send the information of NOR FLASH manufacturer (manufacturer ID and DEVICE ID) to PC. The information of NOR FLASH varies according to different manufacturer or type

Instruction of the process is as follows:
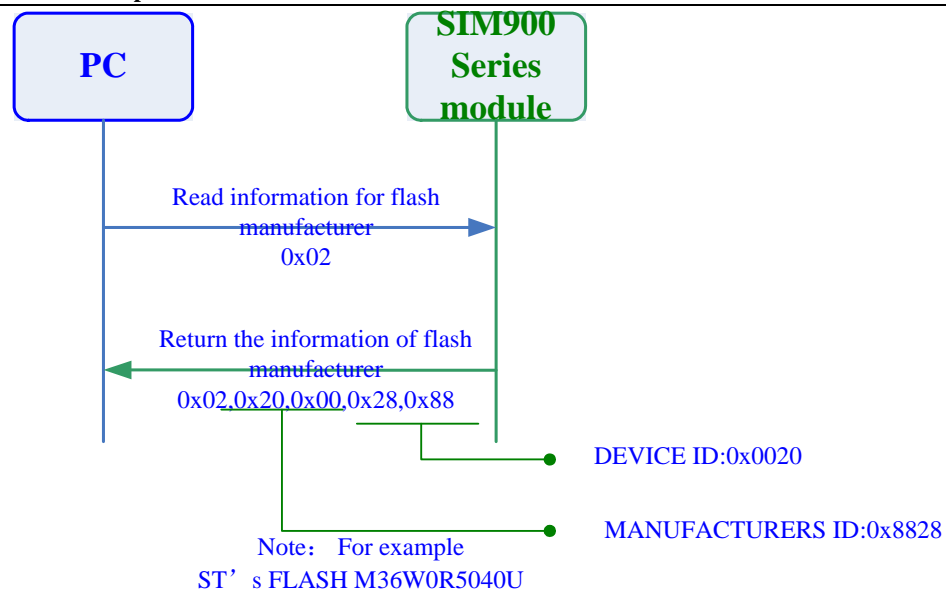
Diagram 2-8   Read the flash manufacturer information

2.8   Configuration for erased area of FLASH (0x09)

After the instruction of "Read the flash manufacturer information" is finished

If the user want to erase the fixed downloaded flash section before the downloading, user needs to execute the instruction of "Configuration for erased area of FLASH", followed by the command of "FLASH Erase", they work for the erasing of the flash

PC set the erased start address (32bit, LE) and the erased size of flash (32bit, LE) by the instruction of "Configuration for erased area of FLASH".

The module will confirm the success of the set by sending the bytes of "0x19" after the module receives this command.

Instruction of the process is as follows:

Diagram 2-9 Configuration for erased area of FLASH

2.9   FLASH Erase (0x03)

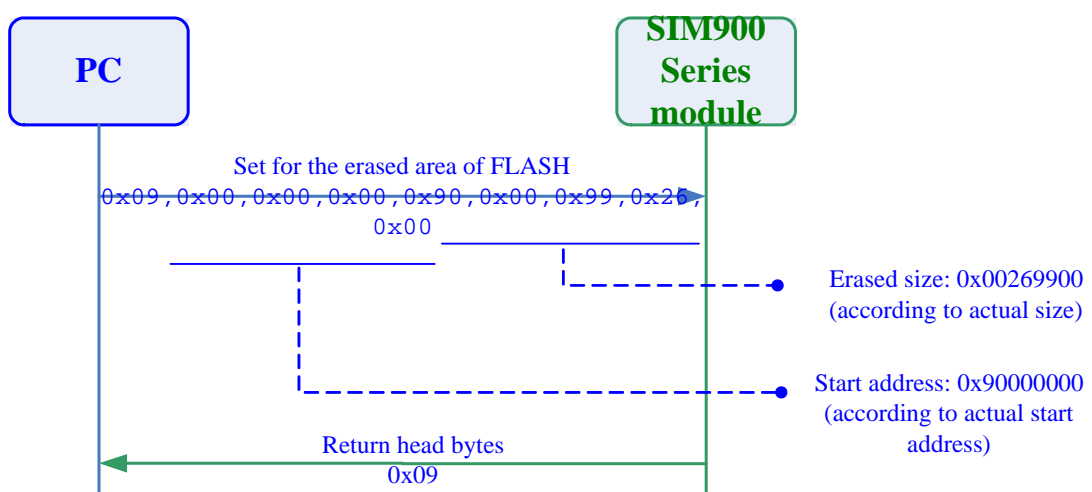After the PC sends the instruction of "FLASH Erase", the module will send the bytes of "0x03" immediately

After that, the module will erase the flash.

After the erasing, the module will send '0'to PC for the indication of a successful erasing.

It can enter the next process, which can be seen as follows:

Note:

The time consumption for erasing may vary according to the size of flash. For Example: it may take about 30 seconds for the size of 2.4M

Diagram 2-10 FLASH Erase

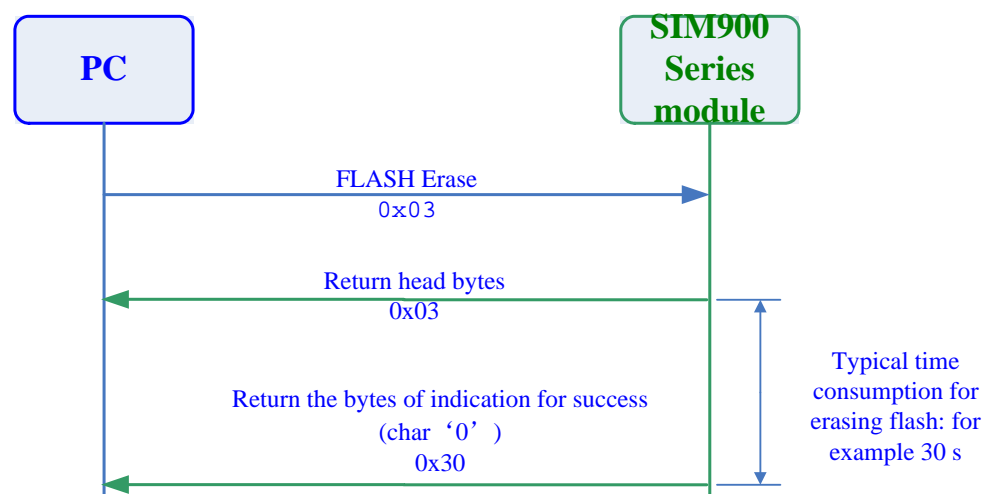## 2.10   Set for downloaded code information (0x04)

After the process of "FLASH ERASE":

PC can set the aimed address (32bit, LE) and the code size (32bit, LE) of downloaded file by the instruction of "Set for downloaded code information".

After the instruction sending from the PC, the module will send "0x04" for the indication of success immediately

Instruction of the process as follows:
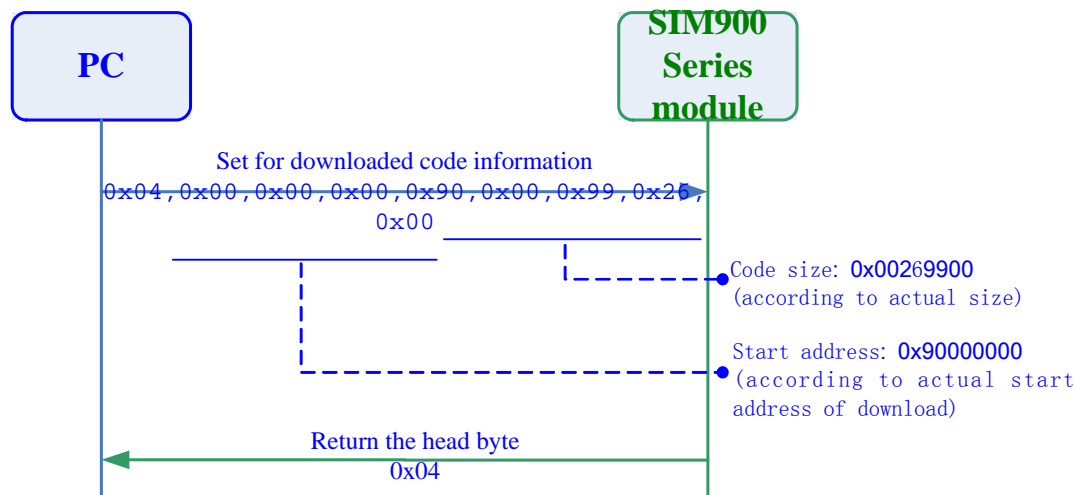
Diagram 2-11 Set for downloaded code information

2.11 Set for the downloaded code section (0x01)

After the instruction of "Set for downloaded code information", user can set instruction length for "downloaded code section", Its typical value is 2048（0x800）。

Refer to diagram 2-12

2.12 Code section download

After the instruction of "Set for the downloaded code section", user needs to download the code section.

PC only needs to send the data, according to length which is given by the instruction of "Set for the downloaded code section"

Module will return（0x2E,0x30）after received the fixed length, it indicate the downloaded success for code..

Instruction of the process is in Fig 2-12
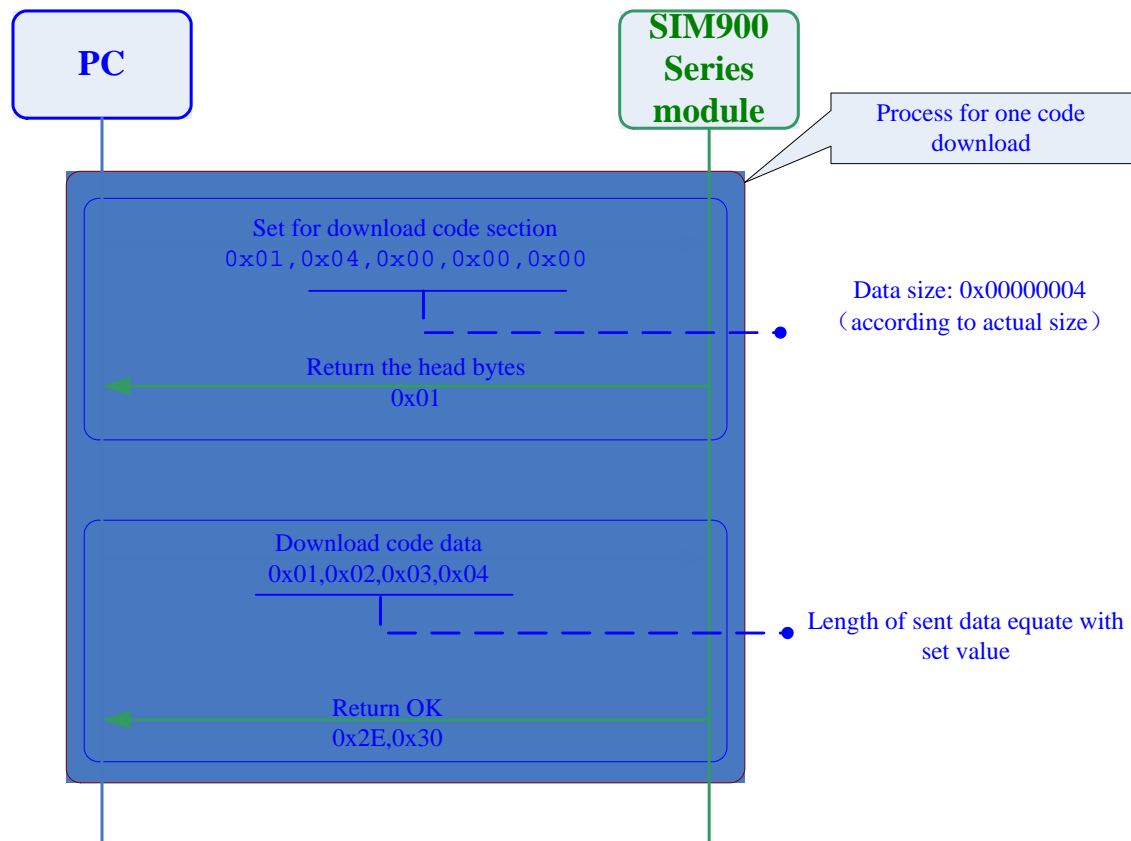
Diagram 2-12 Code section download

> *Note*
>
> *For a successful download, the total length sum of "Downloaded code section" equates with the size of downloaded code file. The downloaded data will be stored in order in the flash when the download is ongoing.*

2.13　Comparision for downloaded information（0x15）

After the downloading, PC sends the instruction of "Comparision for downloaded information". It will send the following information to the module: the start address of downloaded file（32bit,LE）、file checksum（32bit,LE）,the file size（32bit,LE）

After the module receives the instruction, it will send the checksum information（32bit,LE）to PC, which is calculated by the received file.. If the comparision result is the same（0x30）,the downloading is successful. Otherwise it failed

Instruction of the process is as follows:

Diagram 2-13 Comparision for downloaded information

2.14   **Restart of module**

Restart the module, if the module does not receive the synchronous bytes（0x16）within 50ms
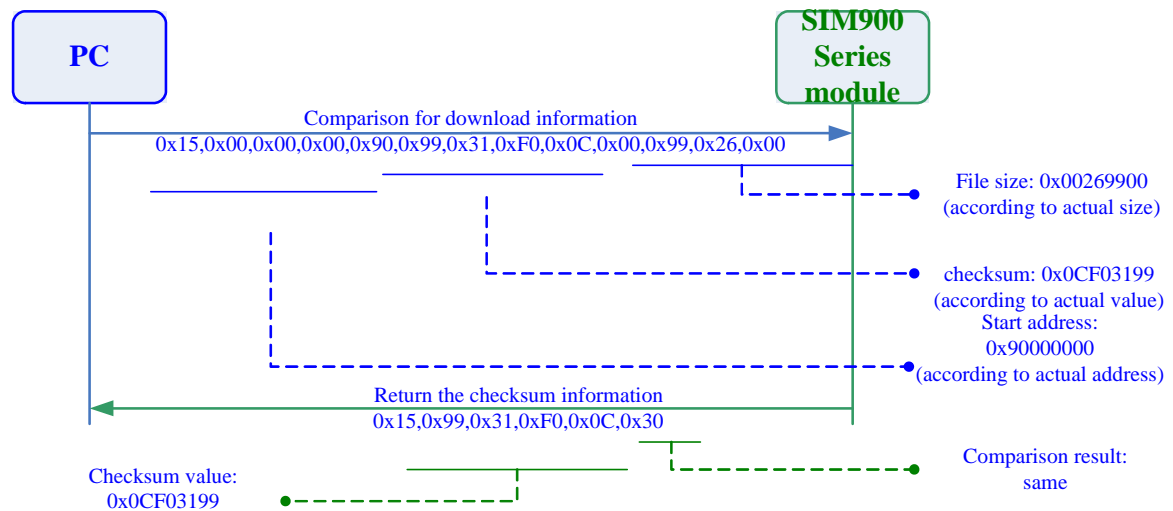（0x16）, the module will run under normal process with the new firmware.

3   Instruction

User needs a number of serial interaction instructions for a successful code download from PC to SIM900

The instruction is always initiated from the PC and the module response

Table 3-1 Response table between PC and Module

Num-ber		Instruction from PC			Response from Module		
	Command type	Head byte	Content		Head bytes	Content	
1	Detection for synchronous bytes	0x16	--		0x16		
2	File of Intel HEX download	--	Depend on HEX		--	Hex downloaded result（8bit,or2*8bit）	--
3	Reconfiguration for downloaded serial port's Baud rate	0x07	Baud rate(32bit,LE)		0x07	--	--
4	Verification for Baud rate's reconfiguration	0x05	Data verification (8bit)		0x05	--	--
5	Set the storage equipment	0x04	Start address (32bit,LE)	size (32bit,LE)	0x04	--	--
6	Read the flash manufacturer information	0x02	--		0x02	Manufacturer number (16bit,LE)	Device number(16 bit,LE)
7	Configuration for erased area of FLASH	0x09	Start address(32bit,LE)	Erased size(32bit,LE)	0x09	--	--
8	FLASH Erase	0x03	--		0x03	--	--
9	Set for downloaded code information	0x04	Start address (32bit,LE)	File size (32bit,LE)	0x04	--	--
10	Set for the	0x01	Data length(32bit,LE)		0x01	--	--

	downloaded code section							
11	Code section download	--	Data			--	0x2E,0x30	--
12	Comparision for downloaded information	0x15	Start address (32bit,LE)	Checksum (32bit,LE)	File size(32bit,LE)	0x15	Checksum(32bit,LE)	Compariso-n result
Note	1. 32bit indicates 32 bit data，LE indicates little edian, that is to say lower bytes is in the relatively former position, for example,"0x12,0x34,0x56,0x78" represents the the Hex number of 0x78563412. 2. 16bit indicates 16 bit data，LE indicates little edian, that is to say lower bytes is in the relatively former position， For example: "0x12,0x34" represents the Hex number of 0x3412. 3. The erased size of FLASH equate with the size of the file. 4. The time consumption between "the execution of FLASH erasing" and its finish depends on the size of the erased area 5. The value of "verification data" in the instruction of "Verification for Baud rate's reconfiguration" is fixed :0x00 6. The typical waiting time between the command sending from PC and its confirm is 4 seconds. If the time period exceed that It can be a indication of download failure. (When downloading the file of "Intel HEX", its total time consumption Is about 3 seconds because of its relatively small size)							

Table 3-2   Instruction from PC and Module response

Number	Instruction from PC		Module response
	Command Type	**Content（hex）**	**Content（hex）**
1	Detection for synchronous bytes	0x16	0x16
2	File of Intel HEX download	Depend on the HEX	0x30,0x00
3	Reconfiguration for downloaded serial port's Baud rate	0x07,0x00,0x08,0x07,0x00	0x07
4	Verification for Baud rate's reconfiguration	0x05,0x00	0x05
5	Set the storage equipment	0x04,0x00,0x00,0x00,0x90,0x00,0x00,0x00,0x00	0x04
6	Read the flash manufacturer information	0x02	0x02,0x20,0x00,0x28,0x88
7	Configuration for erased area of FLASH	0x09,0x00,0x00,0x00,0x90,0x00,0x99,0x26,0x00	0x09
8	FLASH Erase	0x03	0x03
9	Set for downloaded code information	0x04,0x00,0x00,0x00,0x90,0x00,0x99,0x26,0x00	0x04
10	Set for the downloaded code section	0x01,0x00,0x80,0x00,0x00	0x01
11	code section download	Depend on the code section	0x2E,0x30
12	Comparision for downloaded information	0x15,0x00,0x00,0x00,0x90,0x99,0x31,0xF0,0x0C,0x00,0x99,0x26,0x00	0x15,0x99,0x31,0xF0,0x0C,0x30

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